00-D-107, Joint Computational Engineering Laboratory, Sandia National Laboratories, Albuquerque, New Mexico

(Changes from FY 2000 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

This facility will now be capable of meeting Top-Secret Restricted-Data (TSRD) security requirements and the siting of the facility has been changed from the previous data sheet based on a siting study. The TPC for the project increased by $140,000 for costs associated with the evaluation of the TSRD requirements.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request *(Preliminary Estimate)*	2Q 2000	2Q 2001	3Q 2001	4Q 2003	28,870	30,303
FY 2001 Budget Request *(Current Budget Estimate)*	3Q 2000	3Q 2001	1Q 2002	2Q 2004	28,870	30,443

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
2000	1,793 [a]	1,793	1,000
2001	6,700	6,700	3,761
2002	20,377	20,377	17,748
2003	0	0	6,361

3. Project Description, Justification and Scope

Description:

The Joint Computational Engineering Laboratory (JCEL) will be a new, state-of-the-art facility at Sandia National Laboratories for research, development, and application of leading-edge, high-end computational and communications technologies. JCEL will provide office space and laboratories for 175 people in a building with a total of approximately 55,200 gross square feet. JCEL will be the center of Sandia's computational modeling, analysis, and design community, and will be constructed in close proximity to Sandia's existing computer and communications building, presently occupied by part of this community.

[a] Original appropriation was $1,800,000. This was reduced by $7,000 for the FY 2000 rescission enacted by P.L. 106-113.

Justification:

The primary mission of JCEL is to ensure the rapid development and application of high performance computing, modeling, analysis, design, and simulation, which forms the foundation of DOE's Science-Based Stockpile Stewardship (SBSS) vision and, more specifically, supports the Accelerated Strategic Computing Initiative (ASCI). The goal of ASCI is to accelerate the development of simulation capabilities that are needed to ensure the confidence of the stockpile.

JCEL will primarily focus on computational simulation and virtual-prototyping. JCEL focuses on modeling and simulation to support model- and simulation-based life cycle engineering and to serve as a testbed for and a prototype of the "virtual enterprise." In essence, JCEL's mission is to develop advanced Stockpile Stewardship Program (SSP) tools. In JCEL, design alternatives will be explored using iterative simulations of virtual prototypes. Surety and reliability assessments will be model-based and incorporate fundamental understanding of critical component response to the full range and all credible combinations of environmental inputs by DoD. Tools developed within JCEL will ultimately support manufacturing efforts elsewhere within Sandia and the NWC by enabling product design alternatives to be modeled, analyzed, evaluated, and modified as necessary by engineers—all through the use of simulation.

As required by the ASCI, JCEL is critical to Sandia's mission role to serve as integrator of the Nuclear Weapons Complex (NWC) into a "virtual enterprise." JCEL will lead the way with campus-wide distributed technologies, "data everywhere/people-anywhere" data management and data interpretation technologies, and the computational plants to enable it. JCEL will serve as a major integration node—connecting people to people, people to machines, and machines to machines, allowing access, integration, and preservation of information across the entire Sandia, NM site. JCEL will serve as a prototype of the "virtual enterprise," which will serve as a model for how to integrate the many heterogeneous nodes of the existing NWC into a virtual business enterprise for affordable and effective stockpile stewardship.

JCEL will utilize key expertise to create strategic simulations and advanced collaborative environments, and it will provide space for strategic partners from universities, DOE laboratories, and the private sector to work together to integrate the technological expertise of government, universities, and industry. Increased interaction, collaboration, and teamwork are essential for shifting more rapidly to science-based methods and for effective stewardship of the nuclear stockpile. JCEL will provide classified and unclassified space in close proximity to facilitate collaboration between the users of high-end simulation technology and the developers, including research and development partners from universities and industry, while maintaining strict security of classified weapon information. JCEL will also include space designed to encourage interaction and collaboration among the scientists and engineers occupying the building and will provide work space tailored for multidisciplinary, high-performance teams who will develop computer codes and analyze nuclear weapons.

JCEL will provide labs for developing, prototyping and using Virtual Environment Technology, where designers, analysts, and experimenters can interact with each other as if they were in the same room. Moreover, JCEL will use, as well as develop, this leading-edge technology. It will prototype and demonstrate a science and engineering workplace of the 21st century.

The communications networks will enable JCEL's occupants to use the supercomputers in the DOE complex. To display the extensive results of complicated, three-dimensional simulations of nuclear weapons, the JCEL project will also provide computer equipment for virtual reality and advanced visualization techniques, graphics workstations and printers, and video equipment.

To achieve its goals, the JCEL project will provide:

- A facility of approximately 55,200 gross square feet located in Technical Area I of Sandia National Laboratories on Kirtland Air Force Base in Albuquerque, New Mexico.
- Laboratory space, office space, management and administrative space, and interaction and meeting space.
- A facility which will meet Top-Secret Restricted-Data (TSRD) security requirements.
- Classified communications within the facility and between the facility and the rest of Sandia and DOE complex.
- Computer equipment for displaying and printing the results from complex, three-dimensional computer simulations of nuclear weapons.
- Classified computer workstations for use by leading engineers and scientists from the NWC.
- Video equipment for video conferencing, displaying, and editing video images produced by computer simulations.

Benefits

- Reduced program costs through use of high-fidelity computer simulations developed through JCEL programs to reduce the scope of costly test programs.
- Faster response on stockpile stewardship issues that will arise.
- Rapid interchange of appropriate technology.
- Accelerated Defense Programs technology development.
- Cost savings in the development of Sandia research foundation technology base.

Scope:

Plan, design, and construct a new, three-story building to accommodate a total of about 175 people, which will provide classified (at the TSRD level) space in close proximity to the Sandia Central Computing Facility in building 880. The project will provide computer equipment to: display three-dimensional simulations; support engineers and scientists and provide video conferencing capability. Computer equipment includes: Advanced Virtual Reality (VR) display facilities ($2,800,000); Advanced Conference Room Equipment ($1,875,000); and Systems Prototyping Laboratories ($890,000). In addition, the project will move existing furniture and install some new furniture. Site landscaping, parking, pedestrian access improvements, signage, and fencing improvements will be provided.

Project Milestones:

FY 2001	Complete Design	3Q
	Critical Decision 3, Approval to Start Construction	3Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications - $802)	1,604	1,604
Design Management Costs (0.7% of TEC)	213	213
Project Management Costs (0.6% of TEC)	178	178
Total Design Costs (6.9% of TEC)	1,995	1,995
Construction Phase		
Improvements to Land	1,056	1,056
Buildings	12,076	12,076
Utilities	719	719
Standard Equipment	2,431	2,431
Major Computer Items	5,676	5,676
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	895	895
Construction Management (1.6% of TEC)	463	463
Project Management (0.9% of TEC)	255	255
Total Construction Costs (81.6% of TEC)	23,571	23,571
Contingencies		
Design Phase (0.9% of TEC)	263	263
Construction Phase (10.5% of TEC)	3,041	3,041
Total Contingencies (11.4% of TEC)	3,304	3,304
Total, Line Item Costs (TEC) [a]	28,870	28,870

5. Method of Performance

Architectural and engineering design and inspection will be performed by Sandia Facilities Departments and/or under a competitive-bid fixed-price contract based on capability and capacity to perform the work. Construction will be performed under a competitive-bid fixed-price contract or multiple competitive-bid fixed-price contracts.

[a] Escalation rates taken from the FY 2001 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project Cost						
Facility Costs						
Design	0	0	1,000	1,258	0	2,258
Construction	0	0	0	2,503	24,109	26,612
Total, Line item TEC	0	0	1,000	3,761	24,109	28,870
Total Facility Costs (Federal and Non-Federal)	0	0	1,000	3,761	24,109	28,870
Other Project Costs						
Conceptual design costs [a]	989	0	0	0	0	989
Other project-related costs [b]	159	130	168	35	92	584
Total, Other Project Costs	1,148	130	168	35	92	1,573
Total Project Cost (TPC)	1,148	130	1,168	3,796	24,201	30,443

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs [c]	267	259
Annual facility maintenance/repair costs [d]	122	118
Programmatic operating expenses directly related to the facility [e]	52,530	51,000
Utility costs	202	196
Total related annual funding (operating from FY 2003 through FY 2032)	53,121	51,573

[a] Includes NEPA documentation costs.

[b] Including tasks such as Project Execution Plan, Pre-Title I Development, Design Criteria, Safeguards and Security Analysis, Architect/Engineer Selection, Value Engineering Study, Independent Cost Estimate, Energy Conservation Report, Fire Hazards Assessment, Site Surveys, Soils Reports, Permits, Administrative Support, Operations and Maintenance Support, ES&H Monitoring, Operations Testing, Energy Management Control System Support, Readiness Assessment, and Facility Security requirements.

[c] When all facilities are operational in the 2th Quarter of FY 2004, average $267,000 for labor and materials per year. An average of 3.4 staff years will be required to operate the facility.

[d] A total of 1.0 staff years per year are required to maintain the facility.

[e] Annual programmatic operating expenses are estimated at $52,530,000, based on representative current operating expenses of 175 people. The majority of this funding is expected to come from DOE/DP for activities in support of the Nuclear Weapons Stockpile Stewardship Program. Lesser amounts are expected from other sources for activities which are mutually beneficial to the funding source and DOE/DP. By bringing these activities together in one building, we expect the effectiveness of this work to be increased by at least 10% and probably much more. This would correspond to a savings of at least $5 million per year of DOE/DP operating funds.